

Figure 1A

Prior Art



Fig. 2

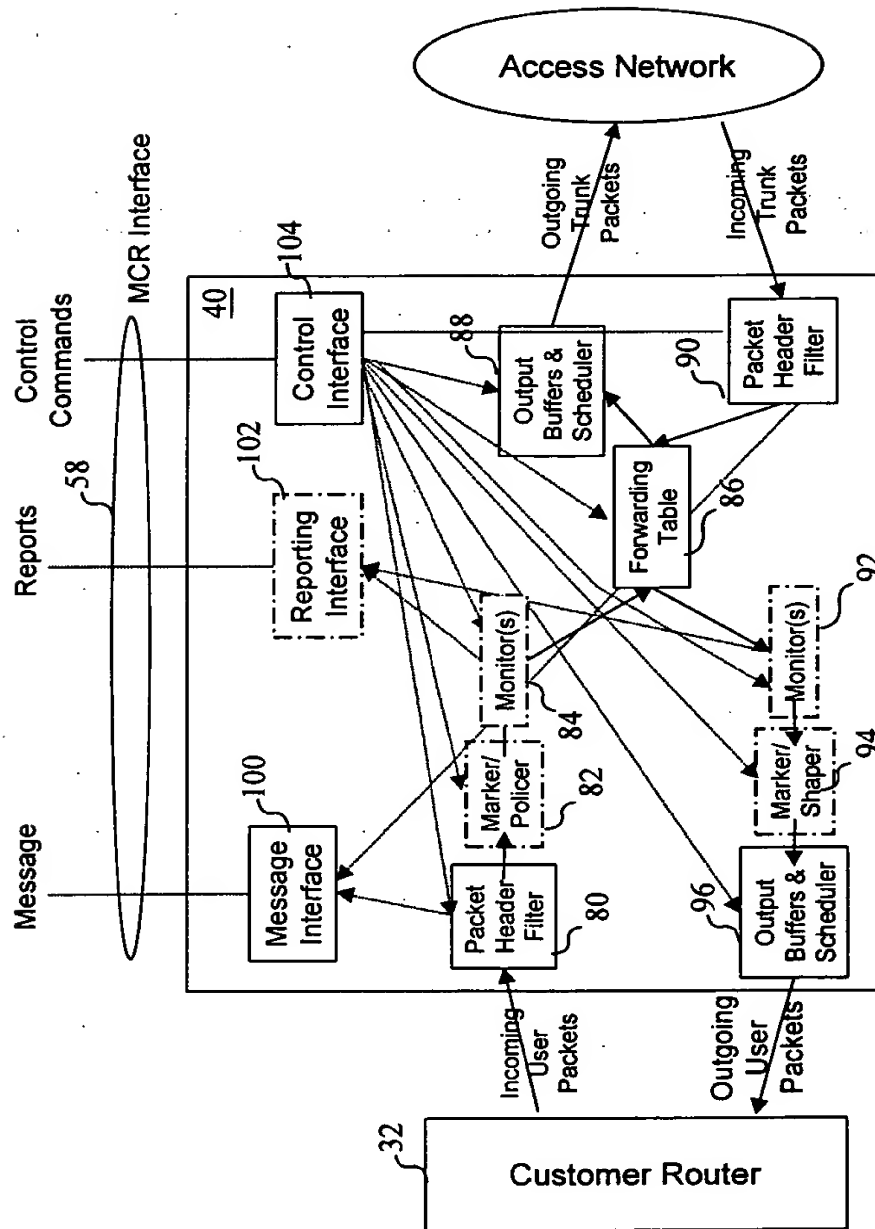


Fig. 3

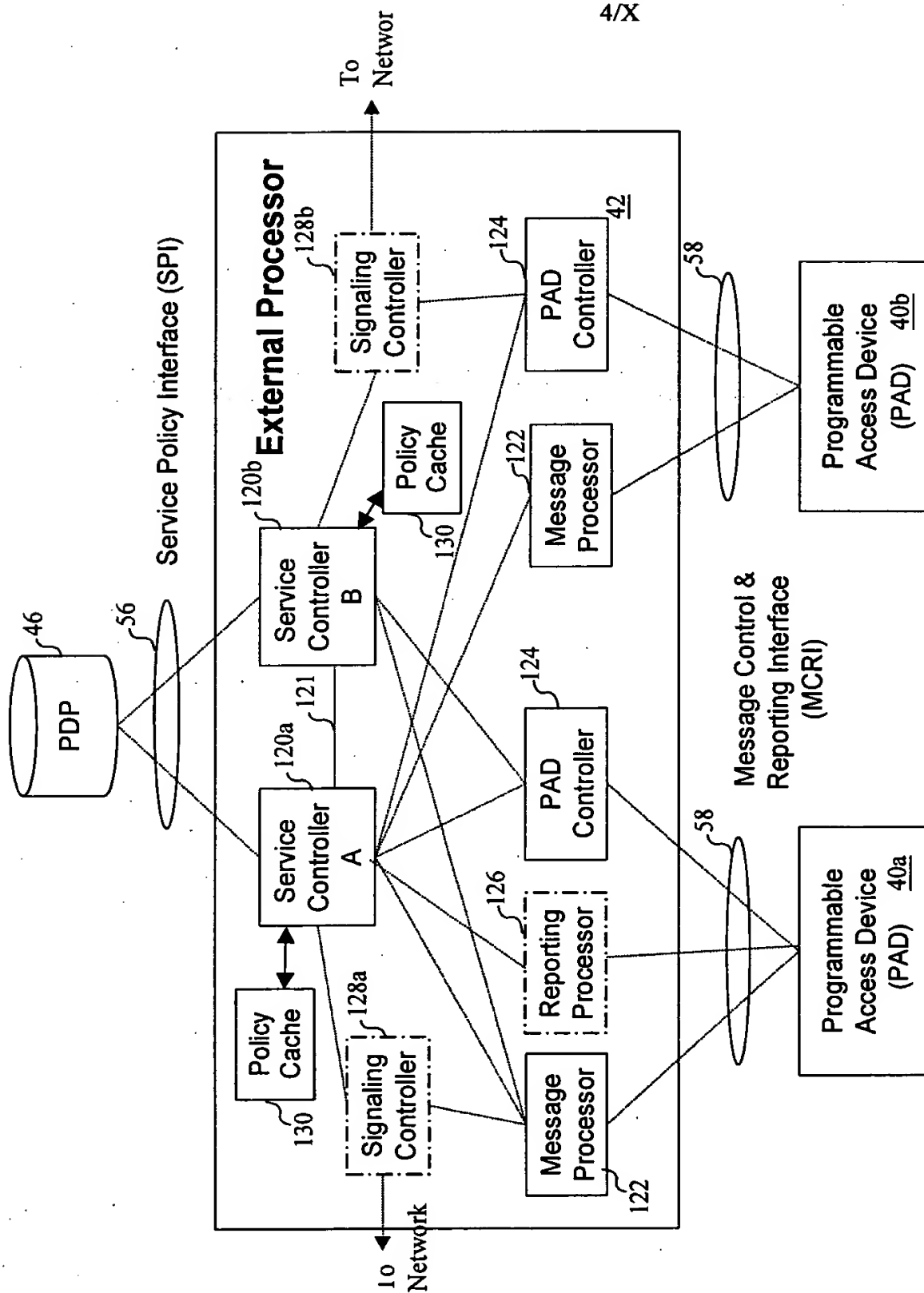


Fig. 4

```
sequenceDiagram
    participant Primary SC
    participant PAD
    participant Secondary SC

    Primary SC->>Primary SC: 1. Connection Abort
    PAD->>PAD: 2. KeepAlive timeout -Primary SC fails
    PAD->>Secondary SC: 3. SYN
    Secondary SC->>PAD: 4. SYN_ACK
    PAD->>Secondary SC: 5. ACK
    PAD->>Secondary SC: 6. Upload Active Sessions
    Secondary SC->>PAD: 7. ACK
    PAD->>Secondary SC: 8. KeepAlive
```

```
sequenceDiagram
    participant Primary SC
    participant PAD
    participant Secondary SC

    Primary SC->>PAD: 1. SYN
    PAD->>Primary SC: 2. SYN ACK
    Primary SC->>PAD: 3. ACK
    PAD->>Primary SC: 4. Upload Active Sessions
    Primary SC->>PAD: 5. ACK
    PAD->>Secondary SC: 6. Prepare to Shutdown
    PAD->>Secondary SC: 7. FIN
    Secondary SC->>PAD: 8. ACK
    Secondary SC->>PAD: 9. FIN
    PAD->>Secondary SC: 10. ACK
    Secondary SC->>Secondary SC: 10. Delete PAD state information
```

Fig. 5B

```

sequenceDiagram
    participant CS as Customer Site
    participant PAD as PAD 40
    participant RBSC as RBSC 120
    participant PDP as PDP 48
    participant Network

    CS->>PAD: 1. RSVP PATH
    PAD->>RBSC: 2. PATH
    RBSC->>PDP: 3,4. COPS
    PAD->>RBSC: 5. PATH
    RBSC->>Network: 6. PATH
    RBSC->>Network: 7. RESV
    PAD->>RBSC: 8. RESV
    RBSC->>PDP: 9,10. COPS
    RBSC->>Network: 11. SVC or LSP ESTABLISH
    PAD->>RBSC: 13. Update PAD
    RBSC->>PDP: 12. CONNECT or CONFIRM
    PAD->>RBSC: 14. RESV
    RBSC->>CS: 15. RESV
    PAD->>RBSC: 16. CONFIRM
    RBSC->>Network: 17. CONFIRM
  
```

The diagram illustrates the sequence of messages for establishing a connection between a Customer Site and a Network, involving a PAD (40), RBSC (120), and PDP (48). The steps are as follows:

- Customer Site sends 1. RSVP PATH to PAD.
- PAD sends 2. PATH to RBSC.
- RBSC sends 3,4. COPS to PDP.
- PAD sends 5. PATH to RBSC.
- RBSC sends 6. PATH to Network.
- RBSC sends 7. RESV to Network.
- PAD sends 8. RESV to RBSC.
- RBSC sends 9,10. COPS to PDP.
- RBSC sends 11. SVC or LSP ESTABLISH to Network.
- PAD sends 13. Update PAD to RBSC.
- RBSC sends 12. CONNECT or CONFIRM to PDP.
- PAD sends 14. RESV to RBSC.
- RBSC sends 15. RESV to Customer Site.
- PAD sends 16. CONFIRM to RBSC.
- RBSC sends 17. CONFIRM to Network.

Fig. 6

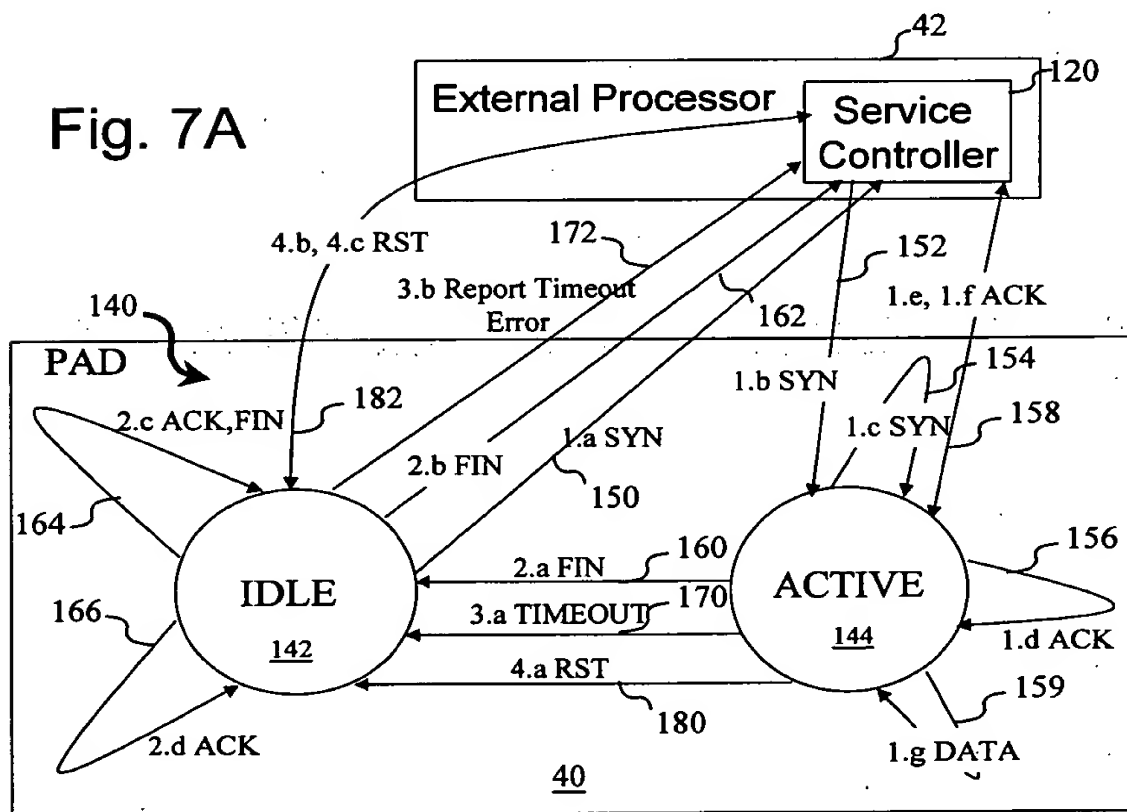


Figure 1 is a block diagram of the system architecture. The diagram shows a **Customer Router** (32) connected to a **PAD** (40). The **PAD** contains a **Message Interface** (100), a **Report Interface** (102), a **Control Interface** (104), and **TCP State Memory** (184). The **TCP State Memory** is divided into **Packet Header Filter Variables** and **Monitor Variables**. The **PAD** is connected to an **External Processor** (42) via a network (56). The **External Processor** contains a **Service Controller** (120). The network (56) is labeled **MCRI**. Arrows indicate data flow: **SYN** from **Customer Router** to **Message Interface**; **SYN**, **Report TCP State Memory Full**, and **Delete TCP Session** from **Message Interface** to **Service Controller**; **Detect TCP State Memory Full** from **Report Interface** to **Service Controller**; and **Delete a TCP Session** from **Control Interface** to **Service Controller**.

```

sequenceDiagram
    participant Client as Customer Site (Client)
    participant PAD as PAD 40
    participant ECSC as ECSC 120
    participant PDP as PDP 48
    participant Server as Network (Server)

    Client->>Client: 1. TCP OPEN
    Client->>PAD: 2. SYN #800
    PAD->>ECSC: 3. SYN
    ECSC->>PDP: 4. LDAP-REQUEST
    PDP->>ECSC: 5. LDAP-APPROVE
    ECSC->>PAD: 6. SYN
    PAD->>Server: 7. SYN
    Server->>PAD: 8. SYN #400, ACK #80
    PAD->>Client: 9. SYN, ACK
    Client->>PAD: 10. ACK #401
    PAD->>ECSC: 11. ACK
    ECSC->>PAD: 12. UPDATE PAD
    PAD->>ECSC: 13. ACK
    ECSC->>Server: 14. ACK
    Server->>Client: 15. CONNECTION OPEN
    Client->>Server: 16. Data, ACK
  
```

Fig. 7C

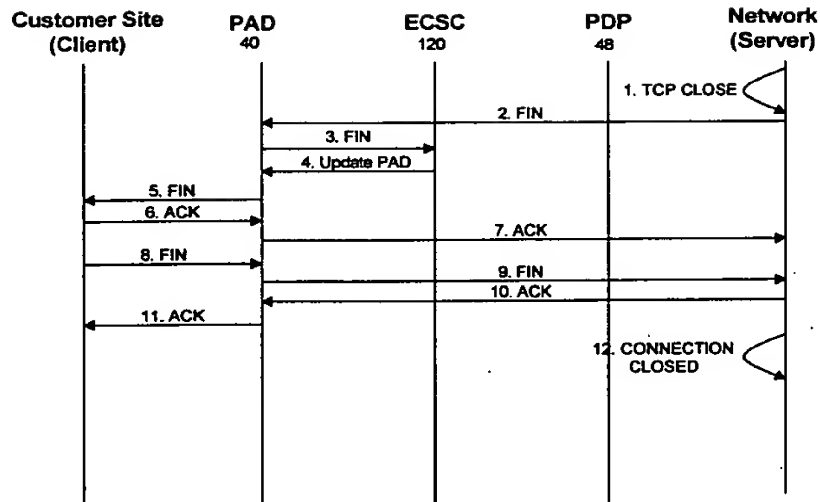


Fig. 7D

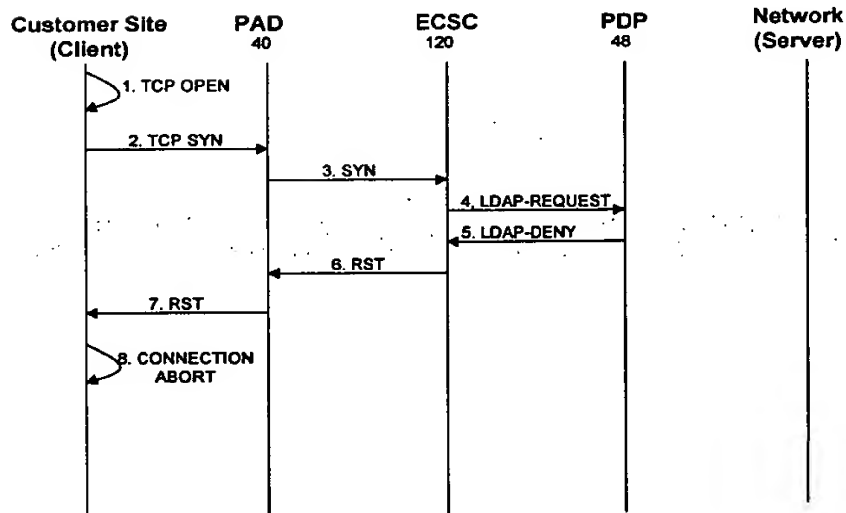


Fig. 7E

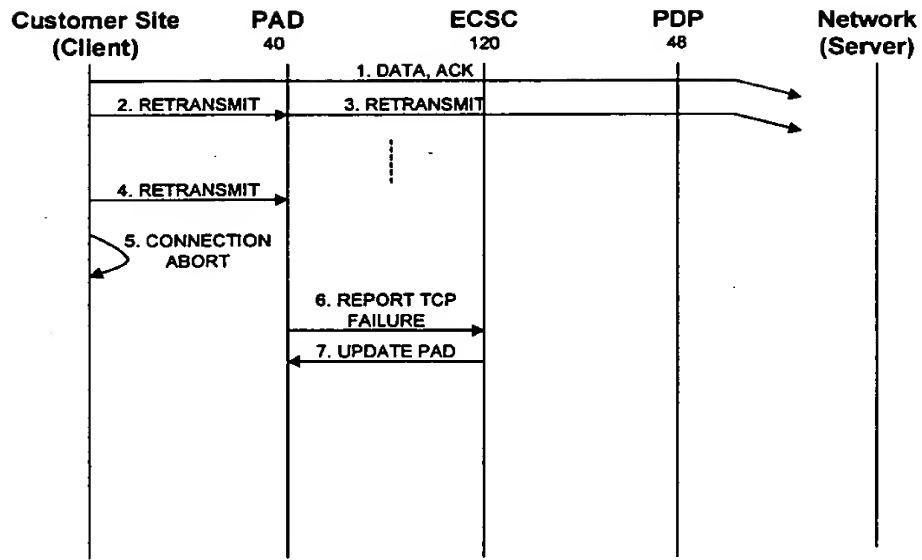


Fig. 7F

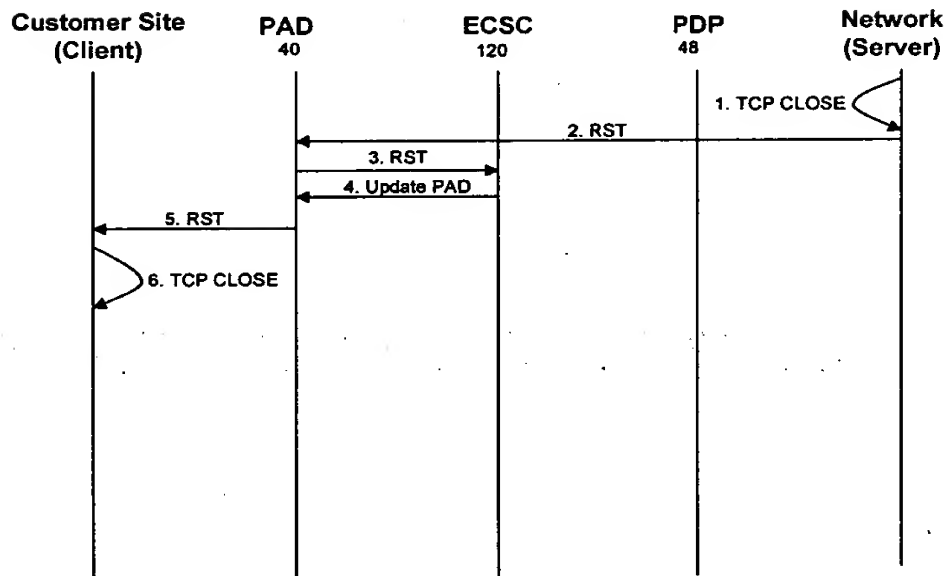


Fig. 7G

Customer Site	PAD 40	IPTeLSC 120	PDP 48	Network
	1. UDPS(Audio Port)			
		2. REPORT AUDIO STREAM		
			3. COPS QUERY	
			4. COPS DECISIONS	
	5. UPDATE PAD			
	6. RSVP PATH			
			7. PATH	
			8. RESV	
	9. RESV			
			10,11. COPS	
			12. SVC or LSP ESTABLISH	
			13. CONNECT or CONFIRM	
	14. Update PAD			
	15. CONFIRM			
			16. CONFIRM	
			17. UDPS	

Fig. 8A

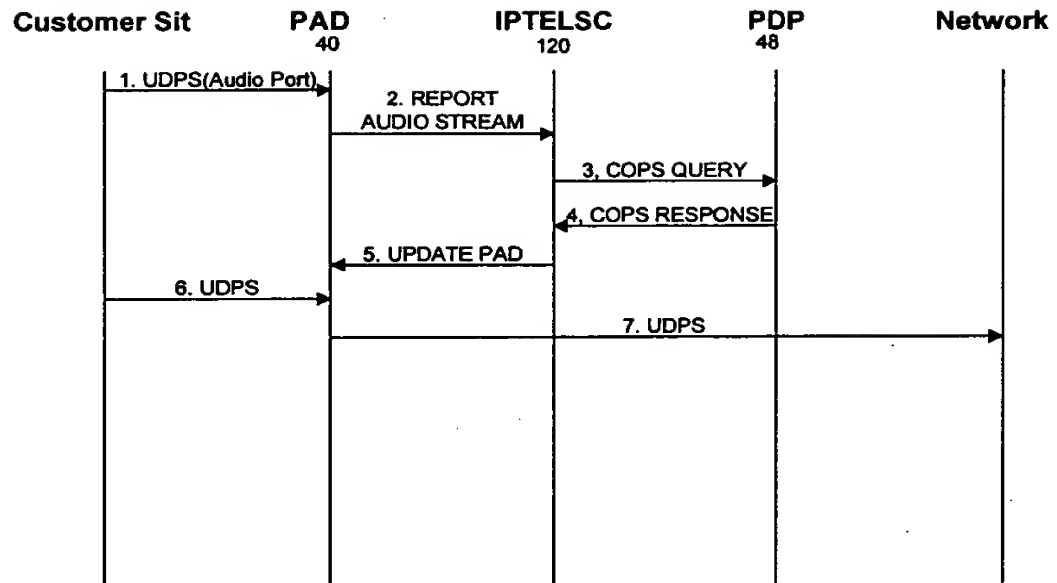


Fig. 8B

003217 00122260

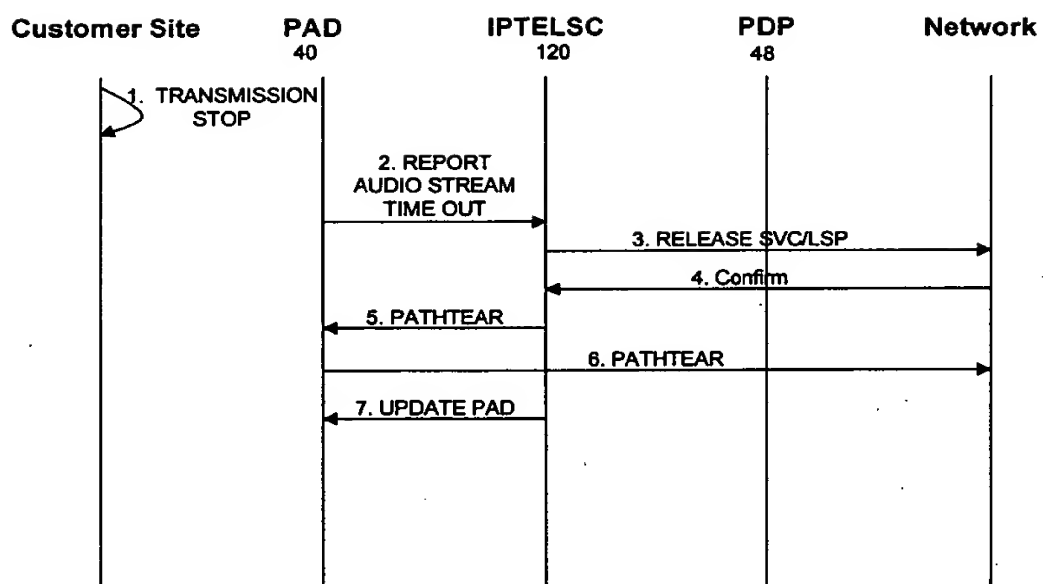
[illegible]

Fig. 8C

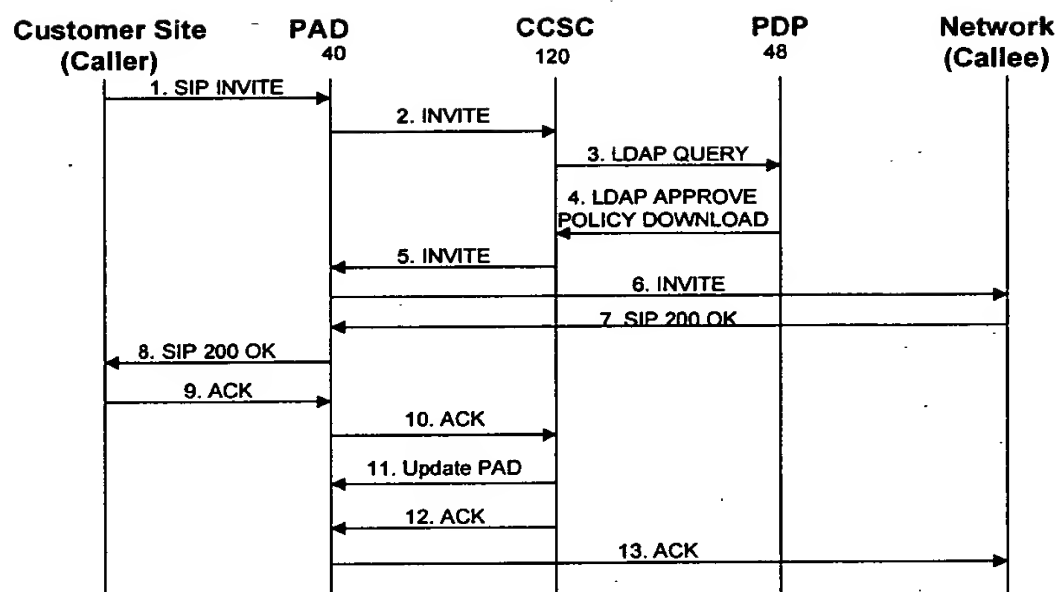
[illegible]

Fig. 9A

```

sequenceDiagram
    participant CS as Customer Site (Caller)
    participant PAD as PAD 40
    participant CCSC as CCSC 120
    participant PDP as PDP 48
    participant Network as Network (Caller)

    CS->>PAD: 1. SIP BYE
    PAD->>CCSC: 2. BYE
    CCSC->>PAD: 3. Update PAD
    CCSC->>PAD: 4. BYE
    PAD->>Network: 5. BYE
    Network->>PAD: 6. SIP 200 OK
    PAD->>CS: 7. SIP 200 OK
  
```

Fig. 9B

```

sequenceDiagram
    participant CS as Customer Site (Caller)
    participant PAD as PAD 40
    participant CCSC as CCSC 120
    participant PDP as PDP 48
    participant N as Network (Caller)

    Note over CCSC: 1. SESSION TIME LIMIT REACHED
    CCSC->>PAD: 2. Update PAD
    PAD->>CCSC: 3. BYE
    PAD->>CS: 4. BYE
    PAD->>N: 5. BYE
    CS->>PAD: 6. SIP 200 OK
    PAD->>PDP: 7. SIP 200 OK
  
```

The diagram illustrates the sequence of events for terminating a SIP call. The participants involved are the Customer Site (Caller), PAD (40), CCSC (120), PDP (48), and the Network (Caller). The process begins with the CCSC initiating a session time limit reached event. This is followed by a '2. Update PAD' message from CCSC to PAD. Subsequently, PAD sends a '3. BYE' message to CCSC and a '4. BYE' message to the Customer Site. Simultaneously, PAD sends a '5. BYE' message to the Network. The Customer Site responds with a '6. SIP 200 OK' message to PAD, which then forwards a '7. SIP 200 OK' message to the PDP.

```

sequenceDiagram
    participant CS as Customer Site (Caller)
    participant PAD as PAD 40
    participant CCSC as CCSC 120
    participant PDP as PDP 48
    participant Net as Network (Callee)

    PAD->>PAD: 1. SESSION INACTIVITY TIMEOUT
    PAD->>CCSC: 2. REPORT TIMEOUT ERROR
    CCSC->>PAD: 3. Update PAD
  
```

Fig. 9D

Fig. 9E

```

sequenceDiagram
    participant CS as Customer Site (host)
    participant PAD as PAD 40
    participant MSC as MSC 120
    participant PDP as PDP 48
    participant ER as Edge Router

    CS->>PAD: 1. Join-Group Report
    PAD->>MSC: 2. Join-Group Report
    MSC->>PDP: 3. LDAP-Request
    PDP->>MSC: 4. LDAP-Approve
    MSC->>PAD: 5. Join-Group Report
    PAD->>ER: 6. Join-Group Report
    ER->>ER: 7. Add the new multicast group
  
```

Fig. 10A

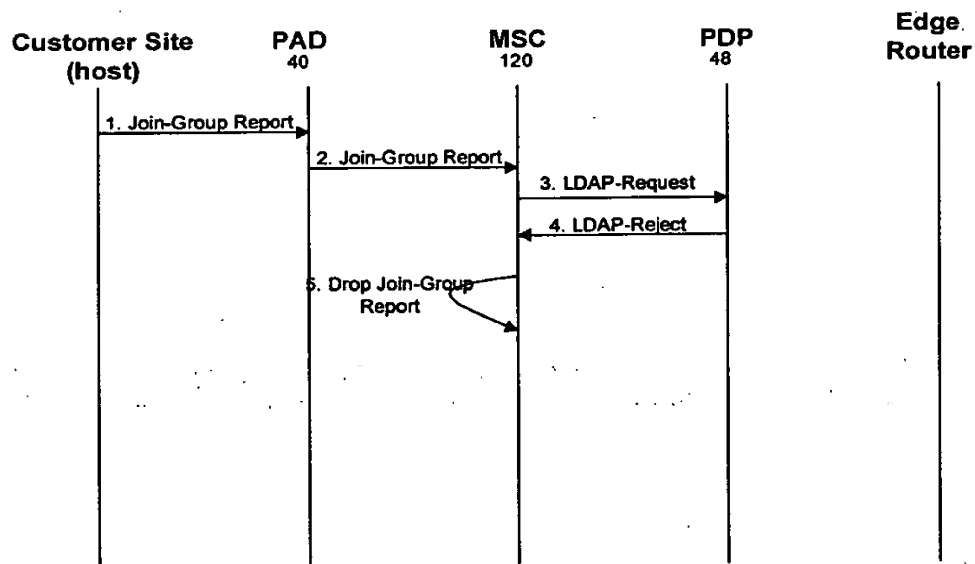


Fig. 10B

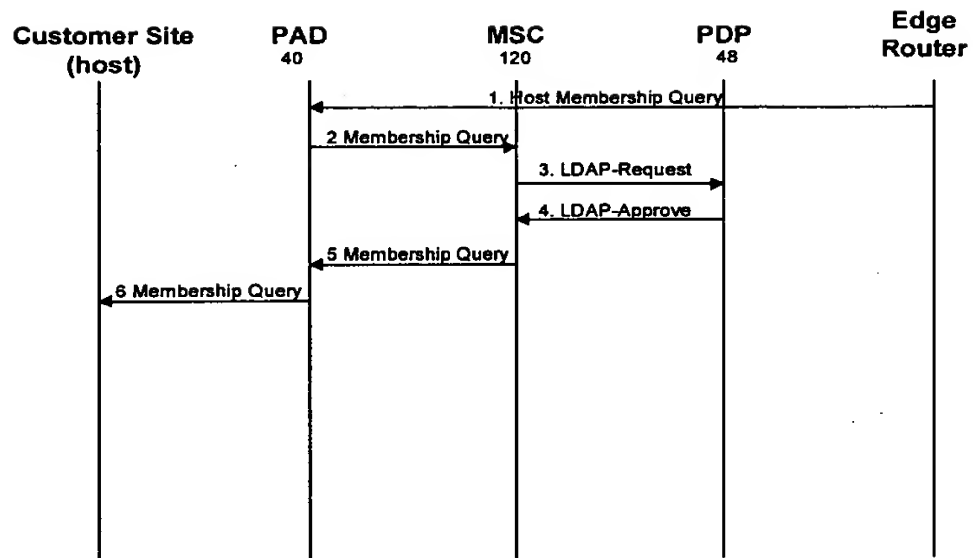


Fig. 10C

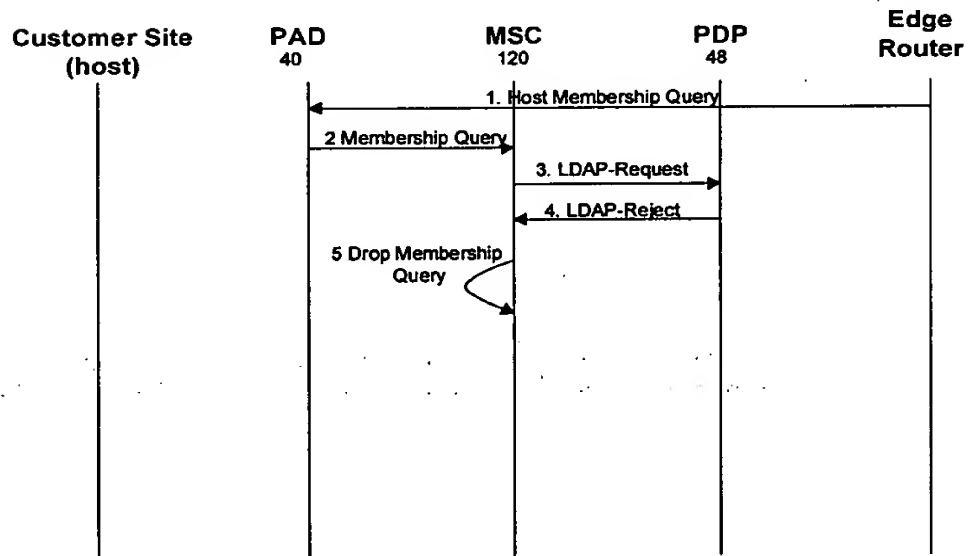


Fig. 10D

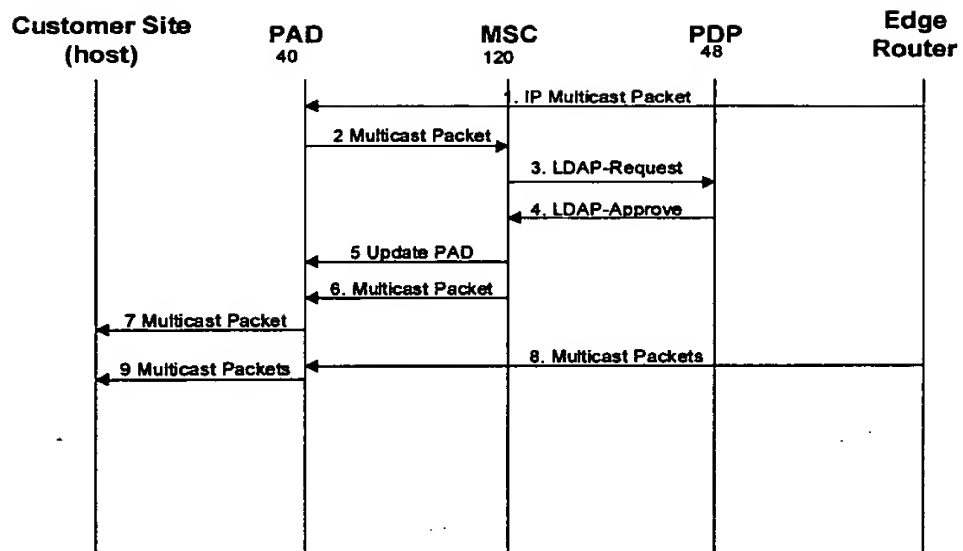


Fig. 10G

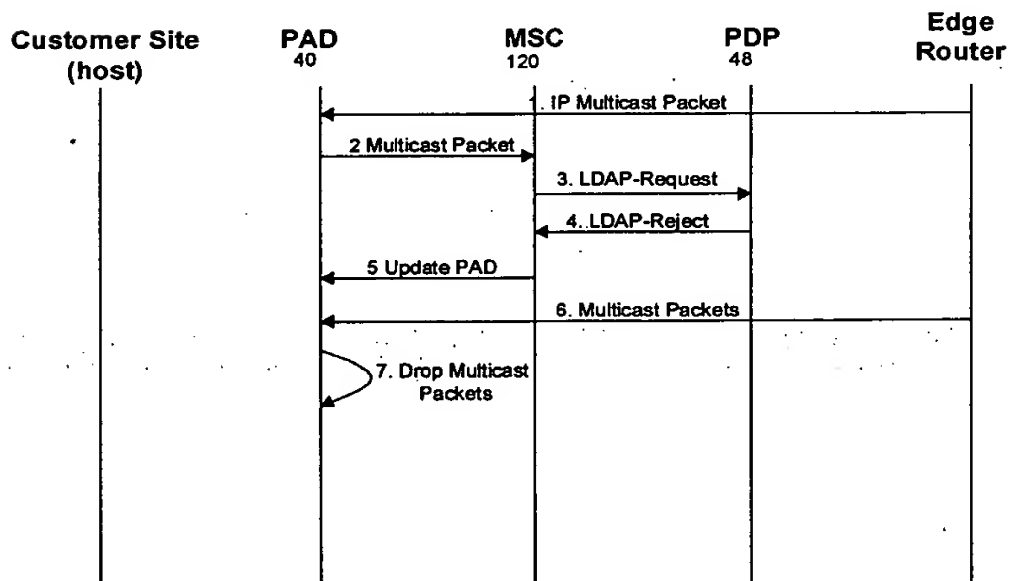


Fig. 10H